

SPARC M7 Processor



Oracle's SPARC M7 processor, with Oracle's Software in Silicon technology, is the industry's most advanced multithread, multicore processor with unique capabilities for information security, database and Java acceleration. It sets the foundation for mission-critical cloud-based server infrastructure with unprecedented levels of security, efficiency, and performance.



KEY BUSINESS BENEFITS

- Improves security and availability by defending infrastructures against data breaches and application software memory bugs
- End-to-end encryption of data with near-zero performance impact, without the cost of special-purpose hardware
- Extreme acceleration of Oracle Database in-memory queries, especially for compressed databases
- Increased productivity with throughput performance of 256 hardware threads
- Cost-effective scalability for growing data center requirements
- Reduced power consumption through fine grained power management
- Investment protection with guaranteed binary compatibility with previous-generation systems

Processor Overview

With its new Software in Silicon capabilities coupled with innovative cache and memory hierarchy, the SPARC M7 processor delivers dramatically higher processing speed and revolutionary protection against malware and software errors.

The Security in Silicon technologies of SPARC M7 include Silicon Secured Memory, which provides real-time data integrity checking to guard against pointer-related software errors and malware. It replaces very costly software instrumentation with low-overhead hardware monitoring. Silicon Secured Memory enables applications to identify erroneous or unauthorized memory access, diagnose the cause, and take appropriate recovery actions.

The Security in Silicon technologies also encompass the cryptographic instruction accelerators, which are integrated into each processor core of the SPARC M7 processor. These accelerators enable high-speed encryption for more than a dozen industry-standard ciphers including DES, 3DES, AES, SSL, and RSA. This eliminates the performance and cost barriers typically associated with secure computing.

The SPARC M7 processor incorporates 32 on-chip Data Analytics Accelerator (DAX) engines that are specifically designed to speed up analytic queries. The accelerators offload query processing and perform real-time data decompression, capabilities that are also referred to as SQL in Silicon. With such in-memory query acceleration, Oracle Database 12c delivers performance that is up to 10 times faster compared to other processors. In addition, the inline decompression feature allows storage of up to twice as much data in same memory footprint, without a performance penalty.

The SPARC M7 processor includes 32 cores supporting up to 256 hardware threads. It is ideal for virtualized cloud computing environments, supporting a large number of virtual machines and delivering excellent multithreaded performance.

KEY FEATURES

- Silicon Secured Memory
- Cryptographic instruction accelerators integrated in the pipeline
- On-chip database query accelerators
- Integrated data decompression with query acceleration
- 32 multithreaded cores and up to 256 hardware threads
- L3 hot cache line migration to nearest partition
- Oracle Solaris binary application guarantee and Oracle Solaris source code guarantee
- Open Oracle Solaris APIs available for software developers to leverage Silicon Secured Memory and Data Analytics Accelerator technologies

RELATED PRODUCTS

The following Oracle servers are based on the SPARC M7 processor:

- SPARC T7-1 server
- SPARC T7-2 server
- SPARC T7-4 server
- SPARC M7-8 server
- SPARC M7-16 server

The per-thread performance is improved with the entirely new on-chip L2 and L3 cache design and increased processor frequency. The 64 MB L3 cache is partitioned and fully shared, and hot cache lines are migrated to the closest partition to minimize latency and maximize performance.

The architecture of core clusters and partitioned cache is ideal for server virtualization and pluggable databases. System administration and performance tuning are easier as the design minimizes interaction between logical domains or between databases.

The processor can dynamically trade per- thread performance for throughput by running up to 256 threads, or run fewer higher-performance threads by devoting more resources to each thread. This allows the system to balance overall throughput versus per-thread performance for optimal results.

SPARC M7 PROCESSOR AND CORE SPECIFICATIONS

- 32 SPARC V9 cores, grouped into eight core clusters.
- Up to 256 hardware threads per processor; each core supports up to 8 threads.
- Maximum frequency: 4.133 GHz.
- Total of 64 MB L3 cache per processor. The L3 cache is fully shared and partitioned by core clusters. Each partition is 8-way set-associative, inclusive of all inner caches.
- Total of 2 MB L2 instruction cache and 4 MB L2 data cache per processor. Each core cluster contains four cores sharing a single 256 KB L2 instruction cache. Each pair of two cores shares a single 256 KB L2 data cache.
- 16 KB L1 instruction cache and 16 KB L1 data cache per core.
- Dual-issue, out-of-order integer execution pipelines, one floating-point unit, and integrated cryptographic stream processing.
- Sophisticated branch predictor and hardware data prefetcher.
- 32 DAX engines; 8 DAXs per processor with 4 pipelines per DAX
- Encryption instruction accelerators in each core with direct support for 15 industry-standard cryptographic algorithms plus random number generation: AES, Camellia, CRC32c, DES, 3DES, DH, DSA, ECC, MD5, RSA, SHA-1, SHA-224, SHA-256, SHA-384, SHA-512.
- 20 nm process technology.
- Open Oracle Solaris APIs available for software developers to leverage the Silicon Secured Memory and DAX technologies in the SPARC M7 processor.

CONTACT US

For more information about Oracle's SPARC M7 processor, visit oracle.com or call +1.800.ORACLE1 to speak to an Oracle representative.

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